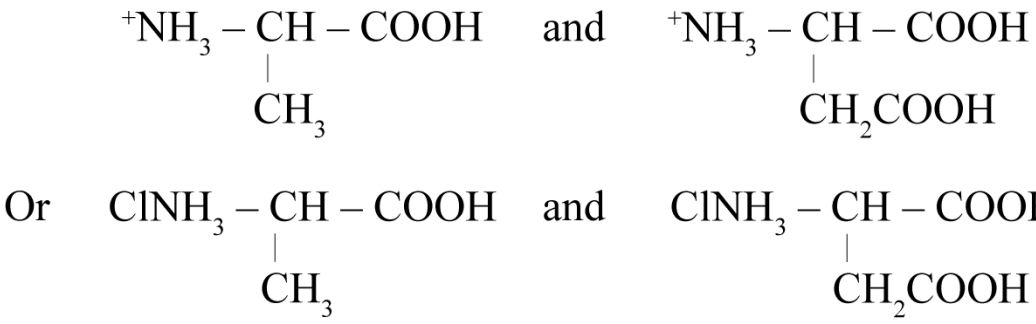
ANSWERS: Carboxylic acids, Amides and Acid chlorides

1) The amide link is hydrolysed in both acid and basic conditions.

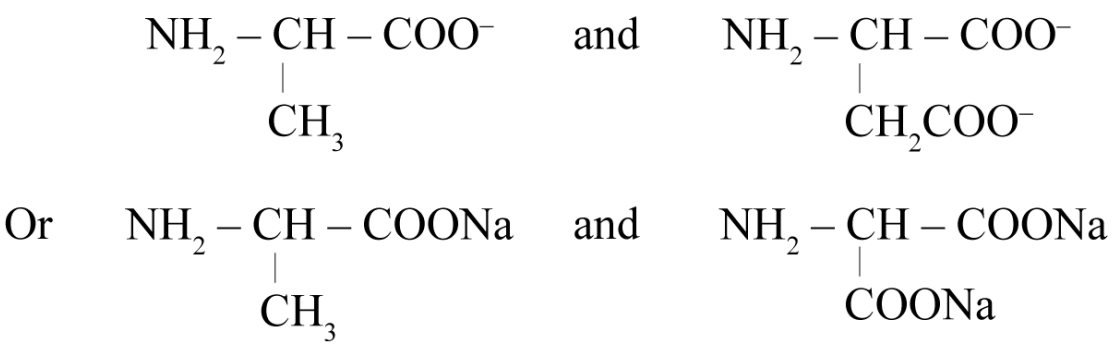
In acid conditions the product is:



The acid will form a salt with the amine group, NH_2.

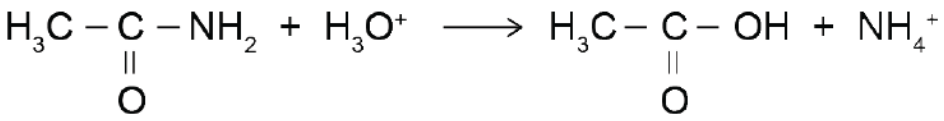
In acidic conditions the amino group will react with the acid as the amino group is a base and will therefore accept a proton and become NH_3^+.

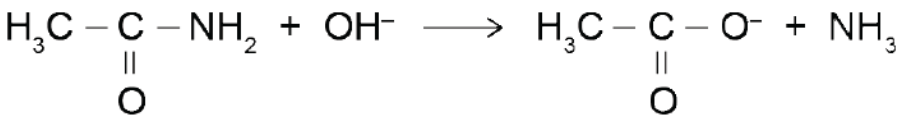
In basic conditions the product is:



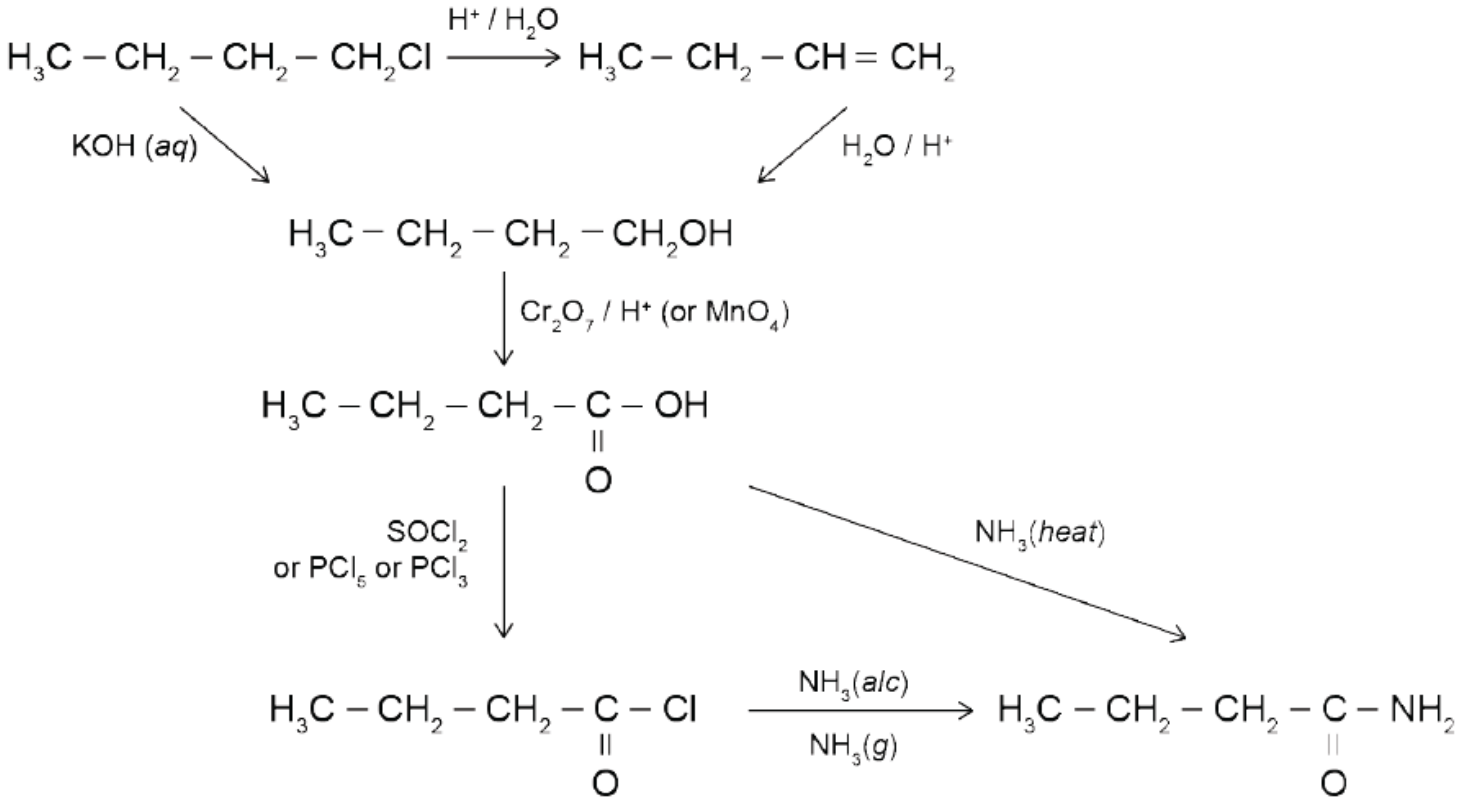
While in basic conditions the carboxyl group which is acidic will react by losing its hydrogen and would become a salt as acids and bases react to form salts.

2) a)

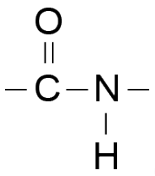




b)

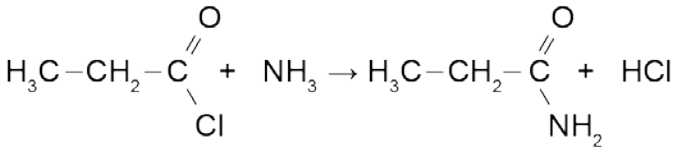


3)



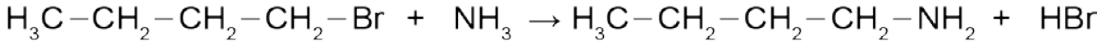
One link is circled.

4) a) A = fluoroethanoic acid (2-fluoroethanoic acid)
B = propanoyl chloride
C = 1-bromobutane
D = hexan-2-one

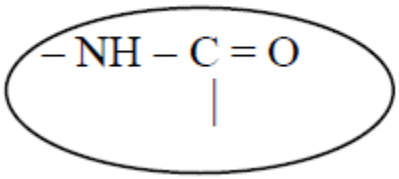


b) i)
not (aq)

or reaction with amine (no aq or alc)

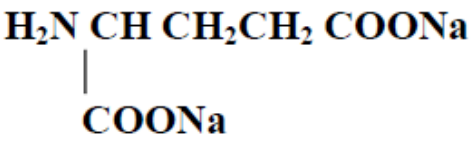
ii) 

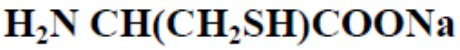
iii) Damp red litmus will turn blue in the presence of the amine but no change with the amide (or clearly indicate solution / add water / aqueous).
OR
Universal indicator.
OR
Add Cu^{2+}(aq) the amine will form a deep blue solution and no reaction with the amide.

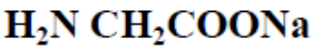


6)

Under **alkaline conditions** products would be







The structures above with COO^- instead of COONa, Under **acidic conditions** the NH_2 group would be protonated (to NH_3^+) in each case and COOH would be present
instead of COO^- / COONa.